# Micro Thruster Development with Green Propellant at mN and microN levels

Completed Technology Project (2011 - 2012)

## Project Introduction

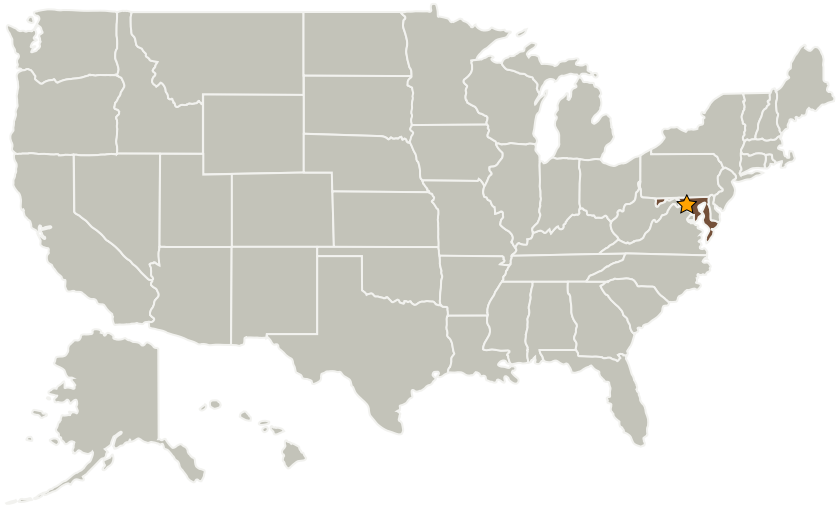
The objective is to develop a high-efficiency micro-thruster using green propellant with electrospray injector that will ultimately provide micro-satellites with the performance required to enable the replacement of large, expensive, multi-role satellites with inexpensive, short-lead time, distributed systems of micro-satellites.

The objectives of the project is the development of single emitter and multiple emitter injectors for doped kerosene; to develop a fundamental understanding of droplet transport, evaporation, and mixing in the complex swirling flow fields required for meso-scale flame stabilization; and the system integration of meso-scale thrust chamber with electrospray fuel injection system. A single emitter electrospray configuration will be developed and the performance benchmarked using Phase Doppler Particle Analysis to determine the droplet size distribution as a function of flow rate. The nature of droplet transport and evaporation at the meso-scale will be studied using non-intrusive laser based techniques. The electrospray injector will be integrated into the existing heat regenerating thrust chamber and fired with kerosene/H2O2.

## Anticipated Benefits

N/A

## Primary U.S. Work Locations and Key Partners

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**Center Innovation Fund: GSFC CIF**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Goddard Space Flight Center(GSFC) | Lead Organization | NASA Center | Greenbelt, Maryland |

| Co-Funding Partners | Type | Location |
|---|---|---|
| University of Maryland-College Park(UMCP) | Academia | College Park, Maryland |

| Primary U.S. Work Locations |
|---|
| Maryland |

### Project Website:

http://aetd.gsfc.nasa.gov/

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Goddard Space Flight Center (GSFC)

**Responsible Program:**

Center Innovation Fund: GSFC CIF

## Project Management

**Program Director:**

Michael R Lapointe

**Program Manager:**

Peter M Hughes

**Project Manager:**

Michael A Johnson

**Principal Investigators:**

Richard J Driscoll
Daniel J Ramspacher

**Co-Investigators:**

Xiaoli Sun
James B Abshire

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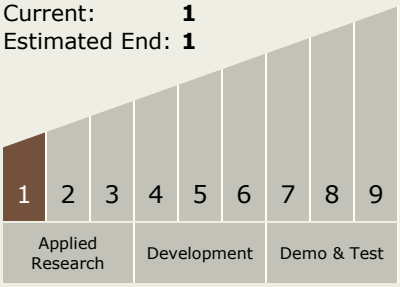
## Technology Maturity (TRL)

Start: **1**
Current: **1**
Estimated End: **1**




## Technology Areas

**Primary:**

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic